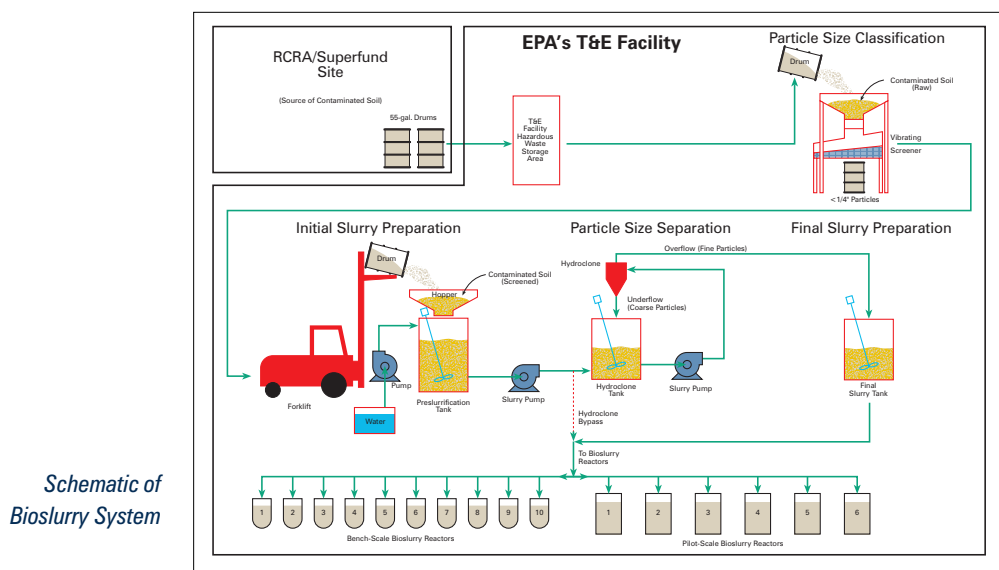


Bioslurry Treatment of Contaminated Soils and Sediments

U.S. EPA Test and Evaluation Facility Research Project



The Technology:

A slurry bioreactor system consists of an aqueous slurry created by combining soil, sediment or sludge with water. This mixture is aerated and agitated in either a closed system or a lined lagoon for a period of time, leading to biological transformation of waste constituents.

Objectives:

The bioslurry project at the U.S. Environmental Protection Agency's Test & Evaluation Facility has been designed to evaluate all components of bioslurry treatment systems from size classification to dewatering of treated solids. The system is equipped with unit process capabilities for pretreatment classification (particle size reduction or separation), bioslurry treatment (bench- and pilot-scale reactors in batch and sequential configurations) and post-treatment capabilities. Full analytical chemistry capabilities are a component of the project's operation.



Bench-Scale Bioslurry Reactors

Project objectives include:

- To evaluate bioslurry reactor operations for treatment effectiveness
- To provide treatability data for site-specific applications of bioslurry treatment
- To provide data for determining optimal bioslurry performance and the design of bioslurry treatment systems

Experimental Approach:

Contaminated solids (soils, sediments or sludges) are size-classified to remove particle size fractions that are more easily washed and abrasive to the slurry reactor. The particle size fraction smaller than 200 mesh (76 mm) contains clay and silt materials which are known to contain the major portion of the contamination. Classification can be accomplished under both dry and/or wet conditions depending on soil characteristics. The slurry treatment process involves the suspension of classified contaminated solids in water at a preselected solids composition, which is fed into a continuously stirred tank reactor (CSTR). Amendments and process conditions are selected to optimize the treatment of the targeted contaminants. The bioslurry reactor offers potentially the best conditions to overcome the limitations of bioavailability by increasing contact conditions between microorganisms and organic contaminants.

Typical Process Parameters:

- Particle size and type
- Solids concentration (10 to 50%)
- Mixing conditions (continuous or pulsed)
- Batch or sequential operations
- Aerobic or anaerobic conditions
- Additions of nutrients and/or microbial cultures
- Surfactant additions



Pilot-Scale Bioslurry Reactors

Current Research:

The current research is centered on the treatment of organic contaminants associated with manufactured gas plants and creosote-contaminated sites. The primary contaminants are polynuclear aromatic hydrocarbons (PAHs). These research efforts are designed to identify the critical elements of each technology to permit a more informed selection and operation of these technologies for treatment of contaminated solid matrices.

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